

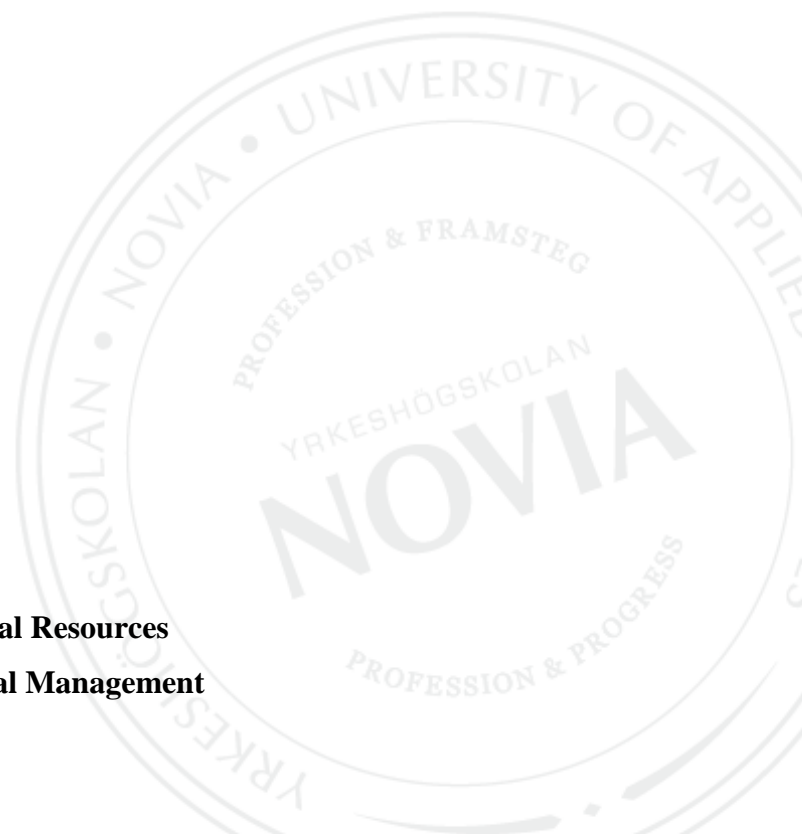


INTERPRETING ENVIRONMENTAL RISKS

OF CIGARETTE BUTT LITTER AT NOVIA UNIVERSITY OF APPLIED SCIENCES – CAMPUS RASEBORG

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ABSTRACT

Littered cigarettes are widespread in the environment. Cigarette consumption is on the rise globally. As the popularity of bans on indoor smoking is increasing, peoples often smoke outdoors. The global environmental load of cigarette waste possibly increases in future. Ecosystems of shorelines and waterways are vulnerable because some of land-based litter ends in multiple layers of snow and is eventually deposited in aquatic environments. Cigarettes contain thousands of chemicals that are toxins to humans, and can leach out from littered cigarettes.

The study assesses the potential ecological risks of cigarette butts waste to the environment. The aim is to lower cigarette butts waste at the Novia University of Applied Sciences – Campus Raseborg and create public awareness about the toxicity of cigarette butts.

The research study is quantitative. Secondary data collected through documents provides the theoretical background. The suitable method for primary data collection is a survey questionnaire to explore the subject deeply. In two weeks, 32 individuals responded to the survey. The response rate of the survey was 11.3%.

Participants responded to questions concerning knowledge, beliefs, and behavior as well as environmental awareness of cigarette butt litter. This research concludes that a pro-environmental behavioral awareness promotion is effective in controlling cigarette butt litter. Despite of active indoor smoke-free policy at Campus Raseborg, an outdoor smoke-free policy will have greater effect protecting the environment.

KEYWORDS: environment; waste; smoking; cigarette litter; butts; filters

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1 INTRODUCTION

Cigarette litter is common in the environment and cigarette intake is on the rise globally. The increasing popularity of bans on indoor smoking leads to people often smoking outdoors. Therefore, the global environmental load of cigarette litter may increase in the future. Ecosystems of shorelines and waterways are vulnerable because part of the land-based litter will eventually deposit in aquatic environments. Cigarettes contain thousands of chemicals that are toxic to humans, and are leaching from littered cigarettes.

The residues of chemicals found in consumed cigarettes and in the discarded butts, are a tiny part of the chemicals used while growing tobacco and manufacturing cigarettes. These chemicals include pesticides, herbicides, insecticides, fungicides, and rodenticides. In addition, chemicals such as arsenic, nicotine, and heavy metals may leach into environment from cigarette butts littered (Moerman & Potts, 2013).

Axxell vocational school provides vocational education to both young people and adults. It is currently one of the largest Swedish-language vocational schools in Finland with about 3,700 students. It operates in nine different locations in the southwestern coastal region of Finland including Raseborg.

In autumn 2014, Axxell vocational school's Ekenäs branch will integrate into the premises of Campus Raseborg Novia University of Applied Sciences. This move certainly requires a considerable amount of time to develop a strategy to accommodate two different age groups at the same premises without harming the immediate environment. The need to devise a common strategy to comply with the rules and regulations prevailing at both ends requires preventive measures to mitigate environmental aspects at Novia University of Applied Sciences, Campus Raseborg. This is because Axxell vocational school's management system has incorporated OHSAS 18001 certifications that are mandatory for any vocational secondary and high school in Finland. According to the Finnish tobacco law, elementary and second-degree schools and school areas should be smoke free.

This paper will serve as a tool that will facilitate the development and implementation of the chosen policies regarding smoking during the integration process. As the cultural climate towards smoking changes, restrictive smoking policies are becoming widely

accepted. However, a crucial difference between policies that accommodate reserved areas for smoking and those that does not allows reserve areas for smoking.

1.1 BACKGROUND

Arraying waste has huge environmental impacts and possibly causes serious problems. According to Eurostat statistics in 2008, the 27 EU countries generated more than 2.6 billion tons of waste including about 98 million tons of hazardous waste (Schrör, 2011). The waste ends up burned in the incinerators or dumped into landfill sites. Either way the waste eventually harms the environment causing air, water, and soil pollution. Dangerous gases are released into the atmosphere, and chemicals are eventually leached into the soil and into the groundwater. The European Union's waste management hierarchies are Prevention, Re-use, Recycling, Other recovery, and Disposal.

Finland has the same approach to waste management. The Finnish national waste plan for 2016, encourage consumers to act responsibly to assess the waste resulted from their consumption, for instance; before buying they should measure the degree of waste a product and packaging is likely to cause. Littering is against the law, and the administration discourages to leave garbage on roadsides and burn it openly (Ministry of the Environment, 2009). Wastes products should go into labeled collection bins. People must separate hazardous waste from other garbage and deliver it to a drop-off collection point for hazardous waste.

Cigarette butt litter is harmful to our environment. The direct costs of cigarette waste include the cost of litter management and collection. Indirect costs include the effect of toxic chemicals and impacts on the environment that is often too complex to calculate accurately (Schneider, et al., 2011). Many institutes have proposed policies to cut cigarette litter but few have fulfilled successfully in Finland.

1.2 COMPOSITION OF CIGARETTES

A typical discarded cigarette butt consists of three parts: un-smoked tobacco, the filter of a cigarette, and a paper wrap. Ingredients of the discarded cigarette butts present their own environmental concern.

1.2.1 TOBACCO

Nicotiana tabacum is a herbaceous plant in the Solanaceae (nightshade family) that originated in the tropical Americas and is now cultivated worldwide as the primary commercial source of tobacco. Cigarette production uses about 80% of all tobacco grown worldwide. China is the world's largest producer of tobacco, although India, Brazil, and the U.S. are also prominent (Food and Agriculture Organization, 2000). There is number of chemicals in unburned processed tobacco, about 23 chemicals can be identified as carcinogenic (International Agency for Research on Cancer, 1987, 1995). Some are naturally occurring in the tobacco plant; others are agricultural chemical residues from growing the tobacco, and the rest are additives and flavorings used in the cigarette manufacturing. In analyses, over 4,000 compounds have been found in a burning tobacco (Hoffmann, 1997).

1.2.2 FILTERS AND PAPER

The filter of a cigarette comprises of cellulose acetate fibers, a slowly degradable plastic in the environment, with an estimated degradation of 18 months or longer in ideal conditions (Ach, 1993). These fibers, each about 20 μ in diameter, are treated with titanium dioxide (a delustrant) and over 15,000 of them are packed tightly together, using triacetin as a binding agent, to create a single filter (Norman, 1999). Most cigarette filters are surrounded by two layers of paper and rayon wrapping, the porosity of which acts to control the airflow through the filter. Regular cigarettes have less spongy wraps to inhibit airflow, but light cigarettes have more spongy wraps to allow for more airflow that reduces smoke yields about regular cigarettes. Cigarette paper also has many chemicals, including glues to hold the paper together and alkali metal salts of organic acids such as *sodium acetate* to keep the cigarette burning while smoking (Norman, 1999).

1.3 PROBLEM STATEMENT

Research has shown that cigarette butts contribute to storm drain trash that eventually ends up in rivers and oceans (Novotny, 2009). Cigarette butts do not biodegrade. Cigarette filters are made of cellulose acetate, which is degradable under ultraviolet rays, but not biodegradable. Cellulose acetate is a form of plastic resistant to biodegradation and that can persist in the environment for generations. Cigarette butts leach out toxic chemicals. Over 4,000 chemicals are discarded into the environment through cigarette particulate matter such as tar or nicotine and mainstream smoke (Slaughter, et al., 2011). The filters can trap residues from smoking including arsenic, cadmium, and toluene.

An estimated 5.6 trillion cigarettes are consumed globally every year and nine trillion are projected for 2025 (Mackay, et al., 2006). Global cigarette consumption is on the rise. An estimated 4.5 trillion cigarettes litter every year worldwide (Murphy, 2013). The global environmental load of cigarette litter will get worse in the coming years; unless there is change in the way smokers disposes cigarette butts.

Used cigarette butts comprise of toxins that include ammonia, formaldehyde, benzene, butane, acrylonitrile, toluene, and alkaloid nicotine (Moerman & Potts, 2011). This waste can affect the health of humans and animals by direct consumption of used cigarettes (Novotny, et al., 2011) or through leachates that enter storm drains, groundwater, recreational bodies of water, and other environments.

1.4 RESEARCH OBJECTIVE

The goal of this study is to assess the potential ecological risks of cigarette butts waste to the environment and create awareness. The aim is to mitigate cigarette butts litter at the Novia University of Applied Sciences, Campus Raseborg area and create public awareness about toxicity of cigarette butts. Knowledge about the toxicity of cigarette butts to the environment will aid in understanding the environmental load of cigarette butt litter. Consequently, regulatory policies and approaches to disposal of cigarette butt litter could be better justified and designed. This research supports findings from earlier studies that cigarette butts are toxic to the environment.

1.5 RESEARCH QUESTION

Research questions are as follows:

How and to what extent are students aware of the environmental bearing of cigarette butt litter?

What mitigation measures to eliminate cigarette butt litter from campus area are available for implementation?

1.6 SCOPE OF THE STUDY AND LIMITATIONS

This study is about cigarette butt litter at the Novia University of Applied Sciences, Campus Raseborg. Therefore, carrying out a survey is important to obtain information about the students, teachers and administrative personnel's awareness, attitudes and concerns about cigarette butt litter. Eventually survey results will facilitate to make recommendations.

Due to the time constraints, quantification of cigarette butts at Campus Raseborg was not possible. For the same reason, interviews with property managers and campus administration were not realized.

The lack of literature on cigarette litter cases from Finland makes this study focus on literature from the United States. Due to time constraint, the survey questions in this study were not tested for evenness in advance.

2 METHODOLOGY

To get important background information and knowledge about the field of research, study material about cigarette butt litter, and its impact on the environment, attitudes, littering behavior, and moral responsibilities towards environment; was accessed from books, scientific articles, journals, and other reliable websites active in the field.

The study employs quantitative methods. The survey questionnaire was the main source for data collection because the survey questionnaire enables researchers to examine and explain relationships between constructs, in particular cause-and-effect relationships (Saunders, et al., 2007). Novia University of Applied Sciences, Campus Raseborg was the main target for the survey. The survey was available online to the students, teachers, and administrative personnel only for two weeks in January 2014. The survey questionnaire covered four areas; litter problems in general; knowledge, beliefs, and behaviors section; and awareness about the environmental impact of the cigarette butt litter. (Annex 1)

The main ingredients of this research paper are literature reviews and the empirical findings. Extracts of theoretical and empirical findings enabled this study to address the central research questions properly. Extract of survey allowed to note down how the students and staff members are viewing cigarette butt litter at Novia University of Applied Sciences, Campus Raseborg. The underlying aim is to check the theoretical findings with practice and thus, analyze environmental impact of cigarette butt litter at Novia University of Applied Sciences, Campus Raseborg.

3 LITERATURE REVIEW

This chapter presents the theoretical base to support the study of the empirical findings. There is a substantial amount of research on the impact of cigarette butt litter on our environment. Also relevant to this paper is previous work examining the environmental impact of litter, public attitudes towards litter, and the moral responsibility of environmental issues. The current review on cigarette butt litter includes toxicity, metals leach from cigarette litter, public attitudes, and moral responsibilities for environment are part of this chapter.

3.1 THE ENVIRONMENTAL PROBLEM OF CIGARETTE BUTTS

Most litter studies have shown that when counting litter on per-item basis, cigarette butts comprise the number one littered item in our environment (Beck, 2007). A more recent study shows that many educational institutes and other public establishments are adopting a smoke-free culture (Levy, et al., 2012). Smoke-free campus policies are becoming common. Despite of effective smoke-free policies at various schools and university campuses, there are few signs of smoke-free campuses having an impact on the cigarette butts litter volume (Lee, et al., 2011).

Sawdey et al. (2011) organized and conducted student cigarette butt clean-up activities. The effort was to estimate the burden of toxic cigarette butt litter and to create awareness of the hazardous nature of cigarette butts on two large university campuses namely San Diego State University and University of California San Diego in the United States. They concluded that clean-up activities are a good source to promote awareness about the cigarette butt litter and its impact on the environment. They suggested that the smoke-free policies on campuses contribute not only to the better environment but also to student health. They stated that to change the littering behavior, one hour clean-up methodology is effective for campuses. Student volunteers were selected to pick up the cigarette butt litter for one hour. The researchers highlighted that further research would determine whether students would support outdoor smoke-free policies after considering the environmental impact (Sawdey, et al., 2011).

Lee et al. (2011) explored in their study at University of North Carolina, United States that the campuses that have implemented both indoor and outdoor policies, compared to the campuses with no outdoor restrictions, had fewer cigarette butt litter. Statistically there was

not much difference in cigarette butt litter on campuses with full, partial or no policy. They indicated that an exposure–response relationship might exist. They emphasized that both indoor and outdoor policies likely provide a better environment for students, staff, the faculty, and visitors. (Lee, et al., 2011).

Novotny and Smith (2009) carried out their study following statistics about nationwide cigarette butt litter in the United States and reports from Ocean Conservancy. They advocate better enforcement of laws against littering to reduce the environmental impact of cigarette butts, additional taxes on tobacco products to go towards clean-up efforts, and more effort on the part of tobacco companies to reduce packaging waste and educate consumers about the impact of tobacco waste on the environment. They suggested several models for action against cigarette butt litter. (Novotny, et al., 2009)

Novotny and Zhao (1999) examined data from two leading United States environmental organizations, the Environmental Protection Agency and the Center for Marine Conservation. They found that for the past eight years, cigarette butts have been the dominating item found during the International Coastal Cleanup Project, accounting for nearly one in every five items collected. (Novotny & Zhao, 1999)

3.1.1 ENVIRONMENTAL CONTAMINATION FROM CIGARETTE BUTT LITTER

Preliminary research suggests that universal cigarette butt litter is harmful to our natural environment. Chemicals released from fragments of the tobacco in cigarette butts have the potential to pollute. Discarded cigarette butts have the potential for rapid and prolonged metal contamination of the immediate environment.

Moriwaki et al. (2009) found that arsenic, nicotine, polycyclic aromatic hydrocarbons, and heavy metals are released into the environment by cigarette butt litter. They collected litter from roadsides for four months and studied the distribution, quantity, and types. They also studied the roadside litter pollutant's load on the environment. They found that the cigarette butts are the most common litter, at the rate of 150-cigarette butts/km/month out of a total of 690 littered items. They used an Inductively Coupled Plasma - ICP analysis for heavy metals, and a Liquid Chromatography and Mass Spectrometry - LC/MS to measure nicotine. They quantified PAHs with a High Performance Liquid Chromatography - HPLC

detector. They confirmed environmental loading of heavy metals from littered cigarette butts. (Moriwaki, et al., 2009)

Moerman and Potts (2011) investigate the amount and behavior of metals leached from cigarette butts in aqueous solution over a range of soaking periods and pH. They confirm that some metals release into the environment rapidly whereas others leach slowly from littered cigarette butts (Moerman & Potts, 2011). They also found that the amount of metal leached from cigarette butts does not vary with pH within the range typical of rainfall. They suggested that the cigarette butt litter is a source of metal contamination. The rapid leach from cigarette butt litter adds harm to the organisms. They experimented by adding cigarette butts into bottles containing aqueous solution of pH between 4.00 and 6.00. They measured the metal concentration of the leachates with inductively coupled plasma optical emission spectroscopy on different intervals. (Moerman & Potts, 2011)

3.2 MORAL REPONSIBILITY FOR ENVIRONMENTAL PROBLEMS

Fransson and Gärling (1999) acknowledged that the previously made efforts to promote pro-environmental understanding among public had not been successful. They stated that it is vital to educate people about environment for the sustainability process to work. They reported that further research is required for the process leading to environmentally responsible behavior. Based on previous researches, they outlined that the issues affecting behavior appear to be knowledge, beliefs, and personal responsibility. (Fransson & Gärling, 1999)

Fahlquist (2009) while conducting a partial research on *Moral Responsibility for Environmental Problems - Individual or Institutional* for the research program Moral Responsibility in R&D Networks in Netherlands, argued that big corporations must not blame the individuals for their moral responsibility to the environmental problems when the corporations themselves function in environmentally destructive ways. The phenomenon to hold individuals responsible for environmental problems is more a backward-looking (conservative and unprogressive) sense. However, in a forward-looking (prospective and remedial) sense, it is reasonable to hold individuals responsible. While explaining the forward-looking sense, the author states that considering socio-economic factors, the responsibility lies on the capacity and resources to contribute to the cause. This means that if an individual who has the capacity to contribute must fully contribute to

protect the environment. Consequently, exemption in responsibility is granted a less capable individual. (Fahlquist, 2009)

Fahlquist (2009) concluded that governments and corporations have a great forward-looking responsibility to create opportunities for individuals to behave responsibly and act in environmentally friendly ways. It is fair to assign forward-looking responsibility to individuals, based on their capacity to contribute to solutions to environmental problems. Furthermore, a considerable share of forward-looking responsibility should be assigned to governments and corporations because they can make the group of capable, hence responsible, individuals larger. The author acknowledged that the moral responsibility for environmental problems applies on individuals as well as institutions. The responsibility needs to be appropriately distributed between institutes and individuals. (Fahlquist, 2009)

Fahlquist (2009) criticized that the trend towards holding individuals responsible for environmental problems is not effective when individuals have their limitations. While explaining the limitations of an individual, the author explains that it is not always easy for an individual to act in an environmentally friendly way because of general obstacles in modern societies making it difficult to act in environmentally friendly ways. Such obstacles are lack of infrastructure, social and business norms, and lack of public transport links forcing the individual to drive; higher costs for organic products than regular products. The author says that these are a few general structural problems and there are individual differences that need consideration too. Furthermore, the author suggests that initially it is the institution's responsibility to make simple and easily accessible information available. They have the authority to create opportunities for individuals to follow what is environmentally friendly and sustainable. As the institutions have authority over the public, they can create and implement easier and affordable adaptation to suite individuals in any capacity morally and economically which would be fair and efficient. (Fahlquist, 2009)

3.2.1 CIGARETTE LITTER: SMOKERS ATTITUDES AND BEHAVIORS

Research exposes different reasons for cigarette butt litter. An absence of ashtrays, a behavior of tossing butts on the ground simply because of their small size, careless attitudes and a false idea that cigarette filters are biodegradable are few reasons. (Philip Morris, 1997)

Smokers have a false impression about cigarette butt littering and its impact because of the butt size; people often assume that it is harmless. Many smokers claim they would properly dispose of cigarette butts if receptacles were readily available; however, when there is none around, smokers are instead littering. It is difficult to understand individual littering behavior, while assuming young adults litter more. Littering habits are difficult to control because they are not considered as serious as other environmental issues. (Rath, et al., 2012)

Rath et al. (2012) found that the littering behavior is misunderstood, and it is important to educate people about the toxicity of cigarette butt litter. They further, described that the study itself can help environmentalists to establish pro-environmental campaigns. Rath states that most smokers are aware that cigarette butt litter harms the environment, but still some smokers do not consider cigarette butt a litter. (Rath, et al., 2012)

Novotny and Smith (2011) performed a study based on the available literature backed by the tobacco industry. They argue that the tobacco industry must take the responsibility of cigarette butt litter. They stress cigarette litter is a cigarette producer responsibility. They state that there are conflicting reasons for smokers to litter. Smokers dislike cigarette butt litter, find them dirty, and are unwilling to hold them until they discard them appropriately. They explain that it is difficult to change the behavior because of the complex mindset of butt litterer. (Novotny, et al., 2011)

Lehman and Geller (2005) emphasized that it is important to address the behavior that is the root of the problem and to explore a solution. They say that behavioral technology can help to protect the environment by increasing the scope of behavioral targets, addressing the problem in a righteous way, and spreading words of wisdom. A strengthened behavior analytic approach may develop to help protect the environment. They argue that research on behavior has declined while research on attitudes towards environment has grown in recent years. They conclude that a behavioral involvement, attempting to increase pro-environment behaviors is necessary. (Lehman & Geller, 2005)

Healton et al. (2011) states that most smokers toss their cigarette butts freely while outdoors. They studied only the inappropriately disposed of cigarette, and called it past-

month litter. They defined past-month littering as selecting on the ground and in the gutter. Those people who selected a trashcan, public ashtray, were not included. They further described different ways to understand the littering behavior. However, they argued that most studies conducted in the past were based on surveys where people self-reported their behavior. They say that there were few conducted studies based on observations. Heaton et al. (2011) emphasized that it is good to understand individuals' littering behavior. (Heaton, et al., 2011)

Finnie (1973) reported observations of individuals in four outdoor spaces as they purchased from street vendors and ate. The result showed that 33% of the people littered. As already was explained, littered places are likely to accumulate more litter. One can state that littering remains an important social and environmental issue even if the rate of littering has fallen largely over the past 40 years. Since this literature is more than forty years old, this gives an idea about behavioral changes by time and development. (Finnie, 1973)

4 EMPIRICAL FINDINGS

There were totally 362 invitations sent electronically at Novia University of Applied Sciences at Campus Raseborg. Due to the time constraints, the survey was only available for two weeks, and during those two weeks 32 individuals responded to the survey questionnaire. The response rate of the survey was 11.3%. The knowledge, beliefs, and behavior views of respondents regarding cigarette butt litter were paid attention to in order to better understand the respondents and eliminate any doubts while concluding the study. The purpose of the survey's questions participant's response to the questions that were about environmental awareness of cigarette butt litter was to measure the level of awareness in general and to take that into account during the process of future policy planning or just to design a pro-environmental campaign.

The survey respondents were from different groups as shown in (figure 1) below, comprising students, teachers, R&D team members, and administrative personnel. (Research & Development – R&D, administrative personnel and teachers – Staff, degree program – DP, Business Information Technology – BIT, Construction Engineering – CE, Natural Resources & Environment – NR&E, Sustainable Coastal Management – SCM)

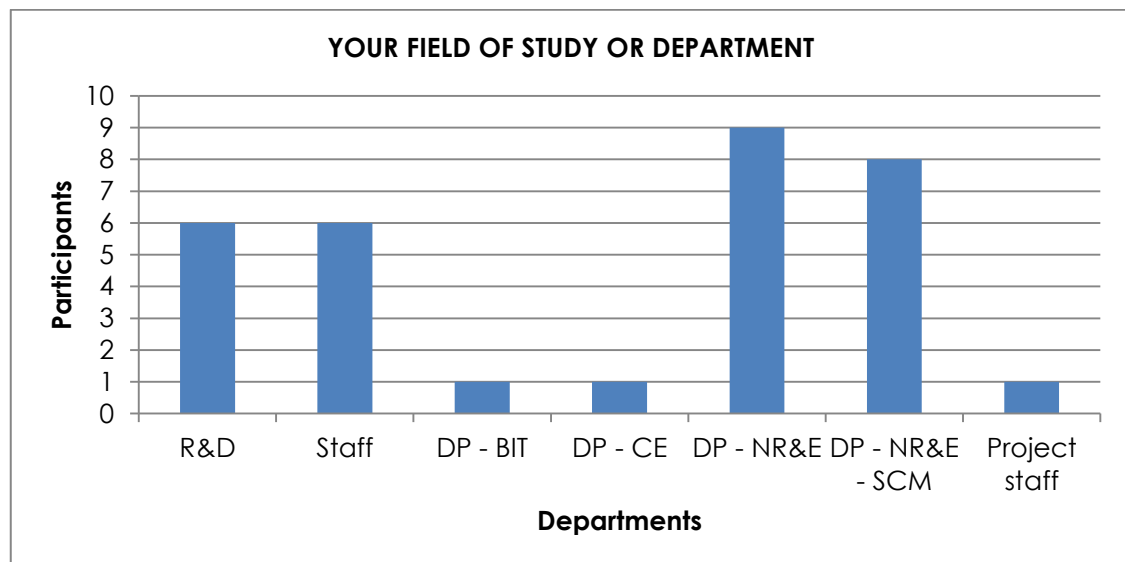


Figure 1. Field distribution of participants $N = 32$

The respondents' affiliation with Novia University of Applied Sciences, Campus Raseborg (figure 2) is from less than one year to more than four years. A majority of the respondents either was newcomers or had been at Campus Raseborg for more than four years.

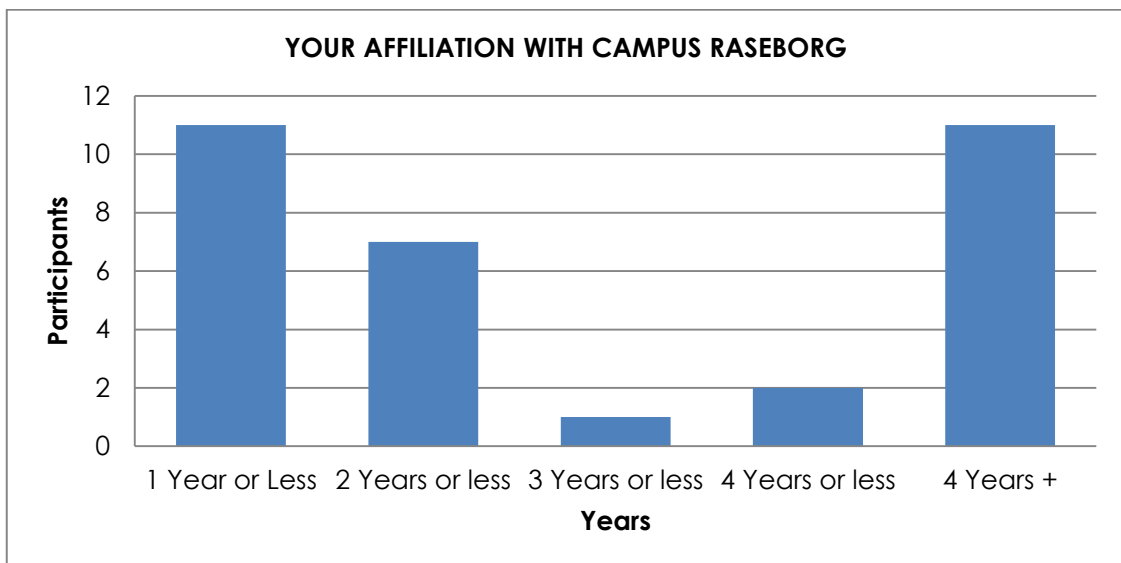


Figure 2. The respondents' affiliation with campus Raseborg $N = 32$

The gender distribution of the survey respondents (figure 3) at Novia University of Applied Sciences, Campus Raseborg was equally distributed.

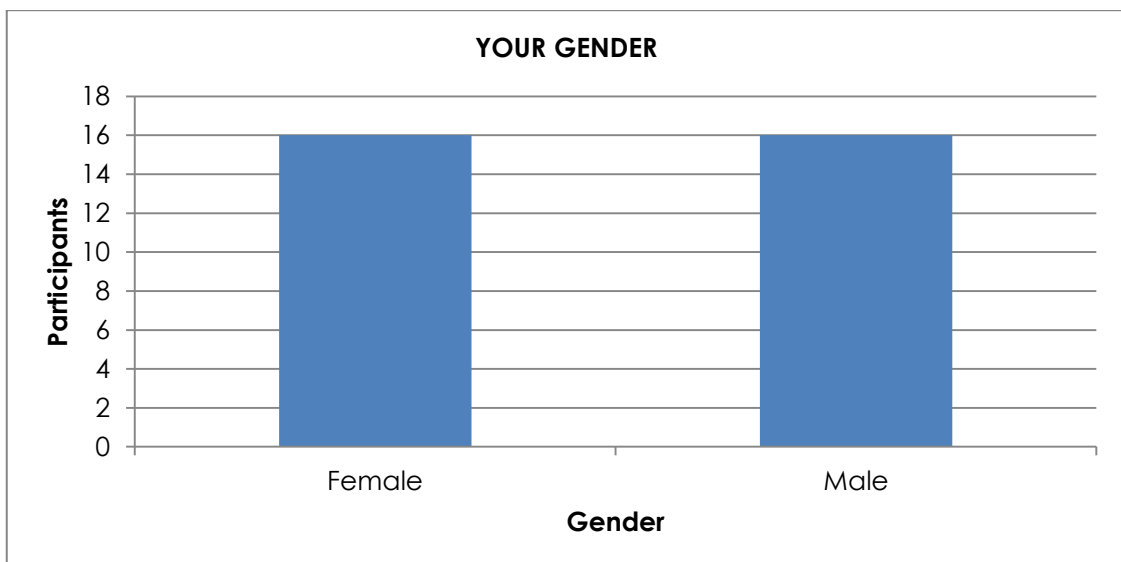


Figure 3. Gender of survey participants $N = 32$

The participants represented five age groups (figure 4) with a majority of the respondents from the age group of 21 – 30 years.

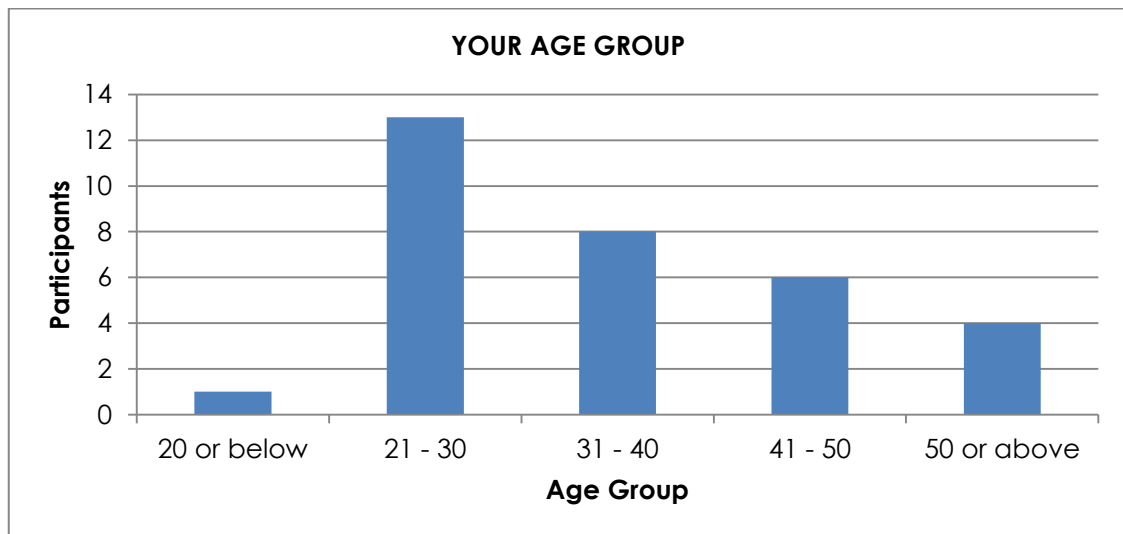


Figure 4. Age distribution among survey participants $N = 32$

Most respondent were willing to learn more about environmental issues through group discussions at campus Raseborg (figure 5). However, they were not sure about their availability. My thoughts behind this question were to find out how many students are willing to participate in exchange of information and intellect. Students often grab knowledge in the classroom. However, sharing it with like-minded fellow students in an multi-disciplinary environment may serve as a platform for further knowledge, and understanding about various fields. I wish I could gather a couple of like-minded fellow students from each faculty of Campus Raseborg and share the knowledge I acquired and learn from them, at the same time.

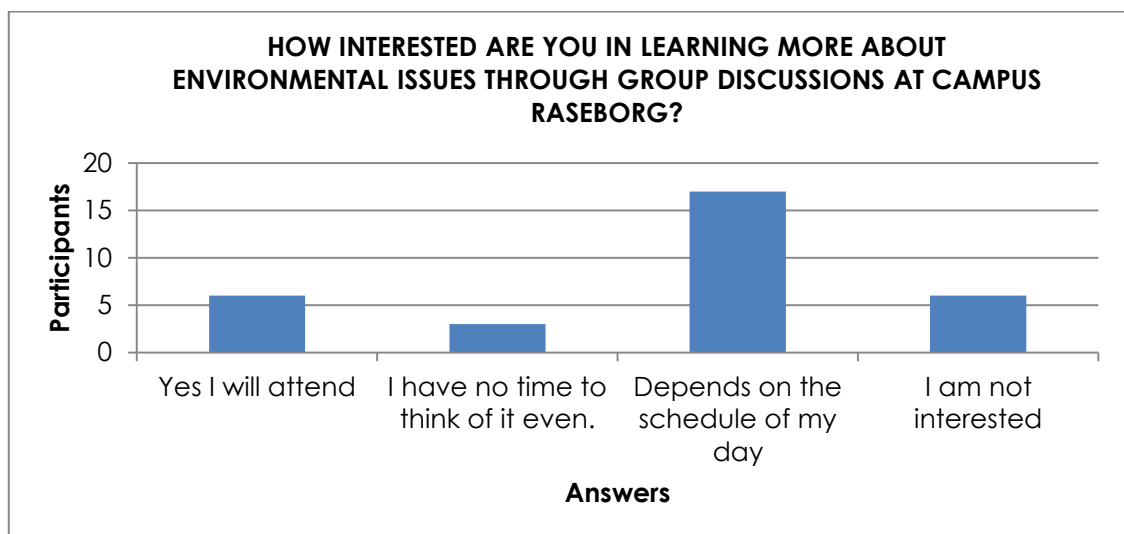


Figure 5. Willingness to participate in group discussions $N = 32$

All respondents agreed that there is a link between health and environment, while answering the question (figure 6): Do you think there is a link between health and the environment in which we live?

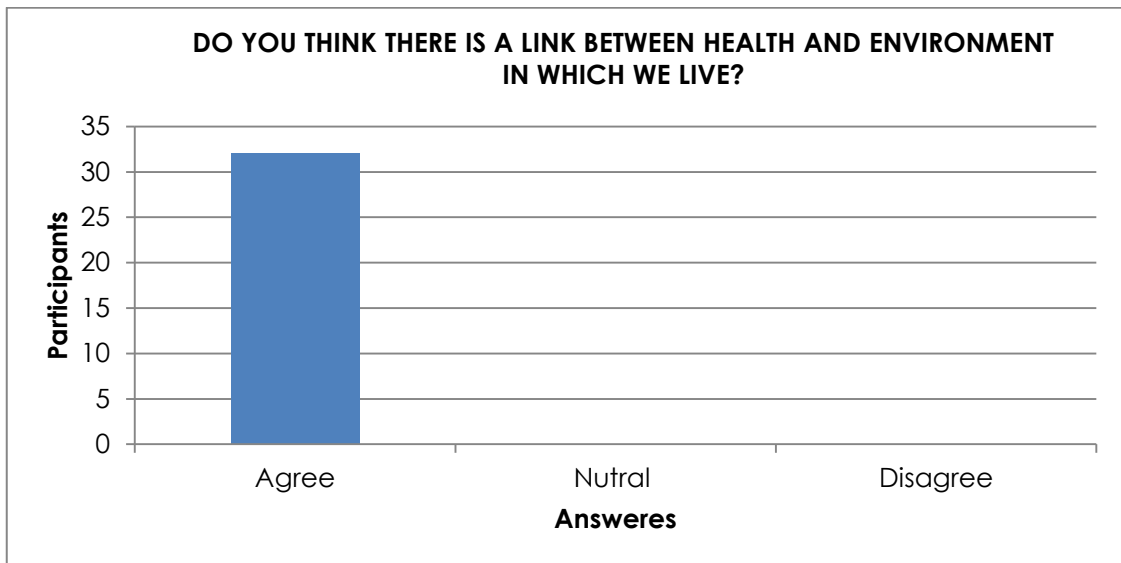


Figure 6. Response about link between health and environment $N = 32$

A small number of respondents considered littering a problem at Campus Raseborg, while answering the question (figure 7) about litter problems.

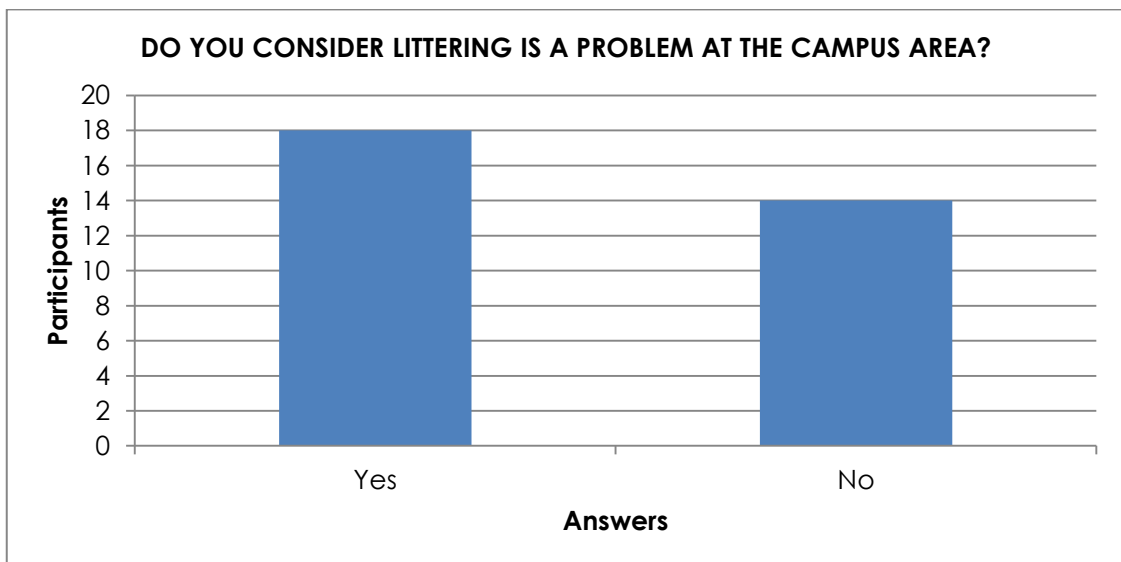


Figure 7. Participant's response about littering problem $N = 32$

Replying to the question: Do you litter? almost seventy percent of participants responded never. However, only five did reply that they litter sometimes.

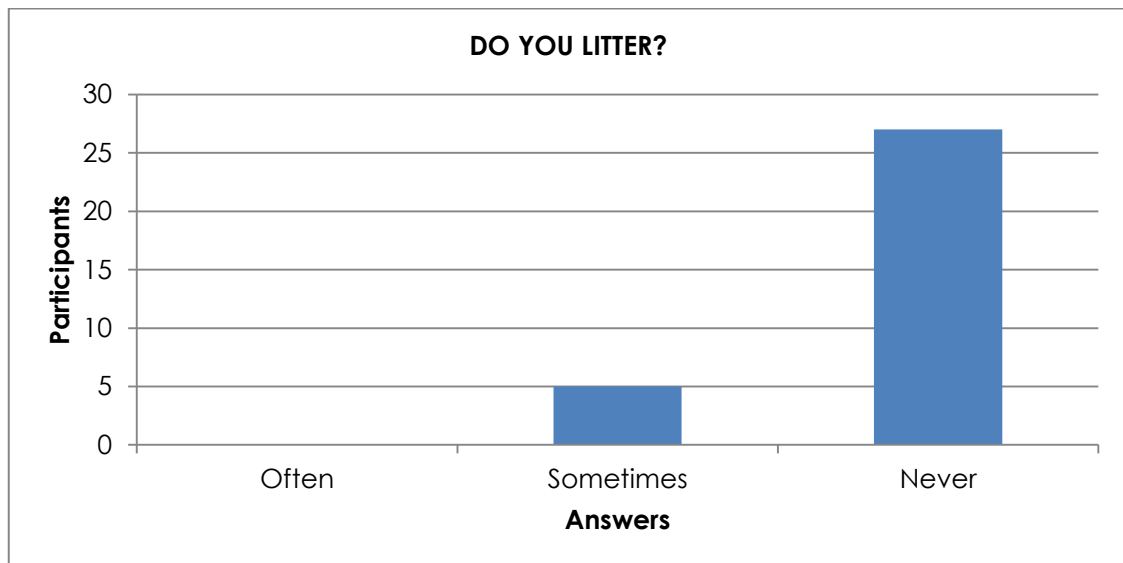


Figure 8. Participant's response to littering $N = 32$

When answering the question about littering reasons (figure 9), which was a multi-choice question, most respondents chose that "it just happened" from the available options. The total number of respondents were $N=32$, however, they had chosen more than one option.

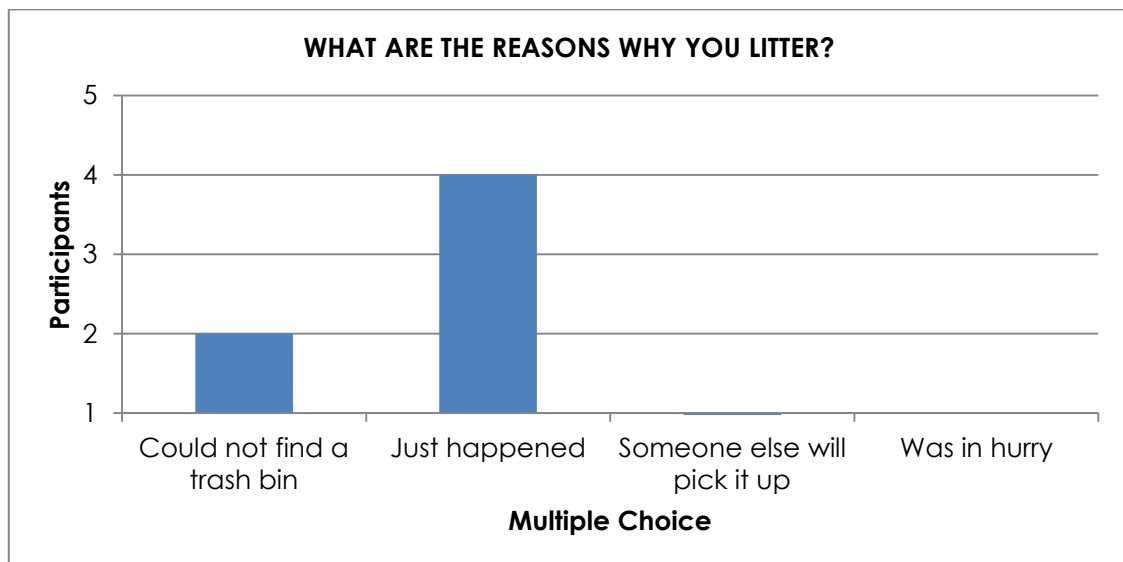


Figure 9. Participants response about reasons for littering $N = 32$

In reply to the question (figure 10): Which of these things would you call litter? (with nine different items to choose as waste), a majority of the respondents had chosen all items as litter.

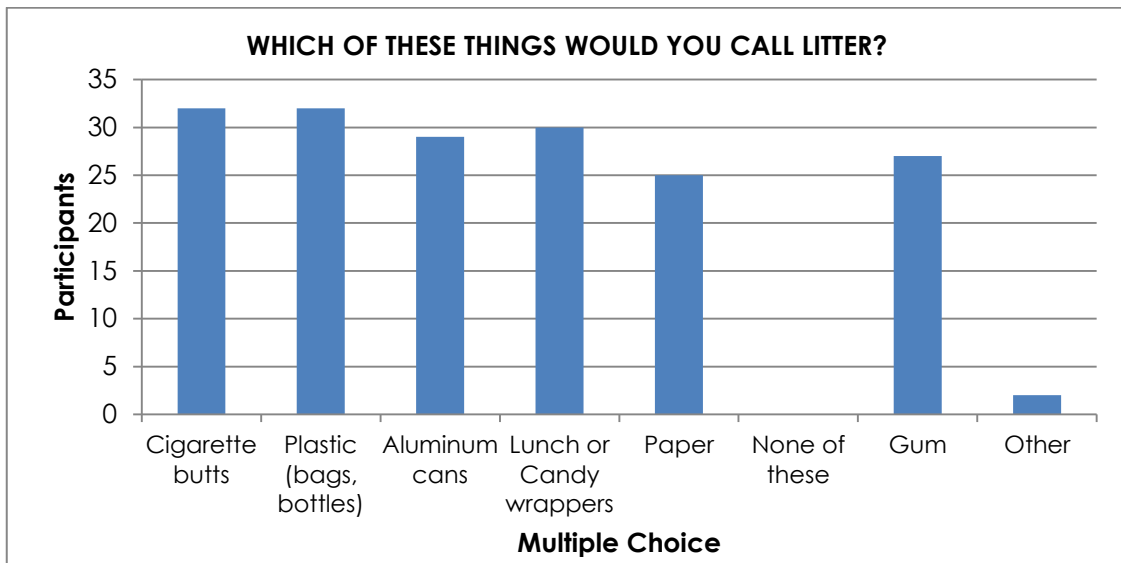


Figure 10. Participants response about litter items $N = 32$

In reply to the question (figure 11): If you see someone, littering what would you do? the respondents endorsed different views. Most respondents chose the options “pick up the litter yourself” and “I would do nothing”.

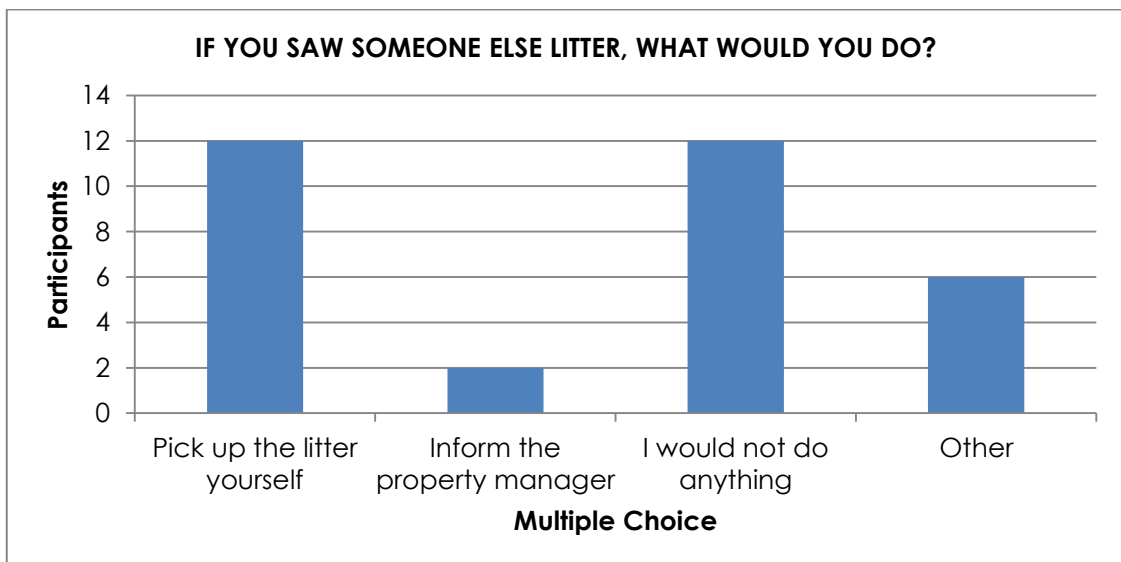


Figure 11. Participants response about litter behavior $N = 32$

The majority of respondents were non-smokers during the time of survey with the exception of five respondents who smoke (figure 12).

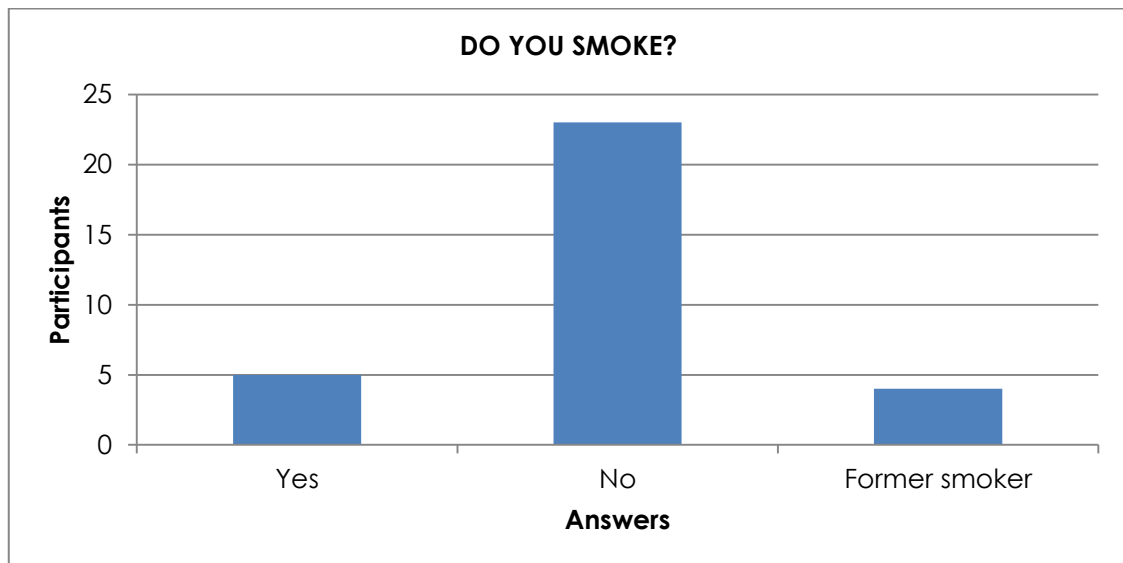


Figure 12. Participants response about reasons for littering $N = 32$

A majority of the respondents are aware of cigarette litter, according to their answers to the question (figure 13): Are you aware of cigarette butt waste?

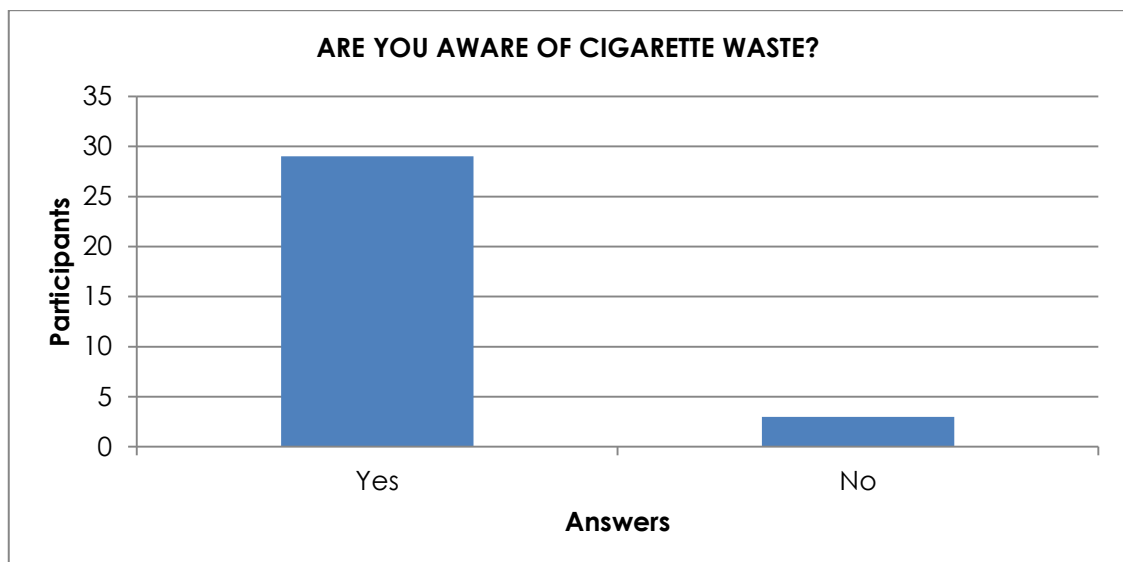


Figure 13. Participants response about reasons for littering $N = 32$

However, regarding the question (figure 14): What do you consider about the cigarette butts waste? a small proportion had a misperception that it is a simple waste.

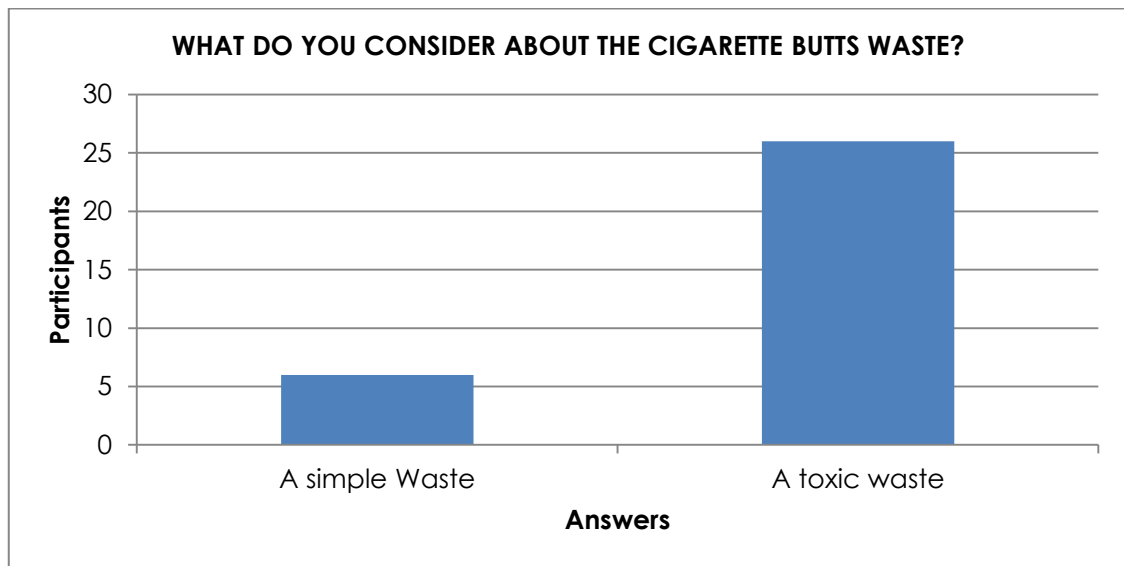


Figure 14. Participants response about reasons for littering $N = 32$

There were five answer options in the question (figure 15): In your opinion, what is the impact of cigarette butt waste on our environment? The respondents believed the cigarette butt litter pollutes soil, water, and air respectively. A small number of respondents chose the answer “all of above from the selection”.

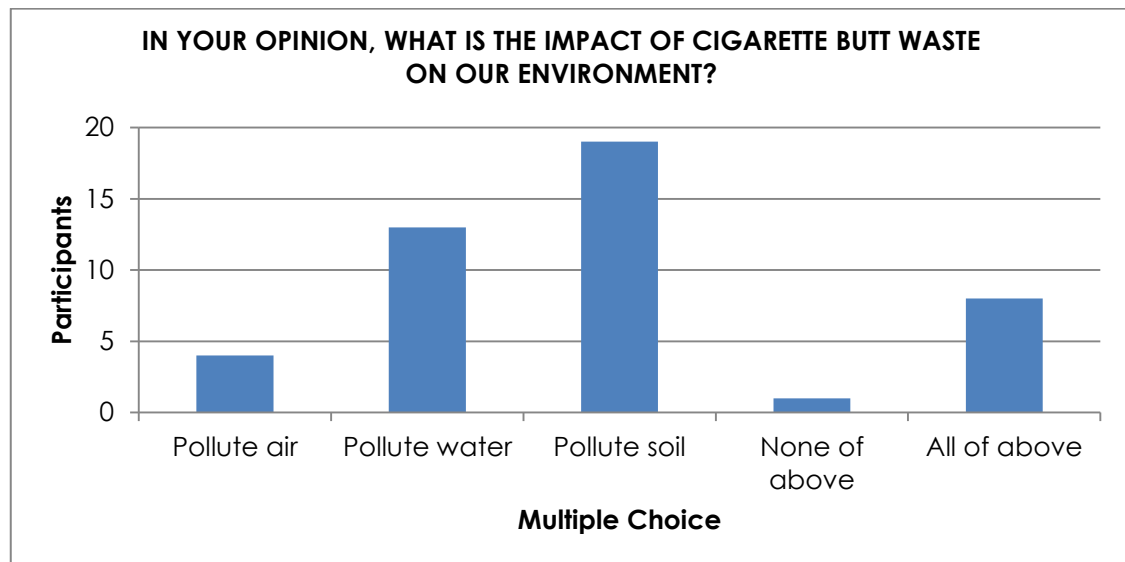


Figure 15. Participants response about reasons for littering $N = 32$

The question (figure 16) In your opinion, how should the cigarette butt waste be controlled? include four answer options. Most respondents answered “everyone should take care of their own waste”, considering individual responsibility. However, a minority of the respondents put the responsibility on the property owner.

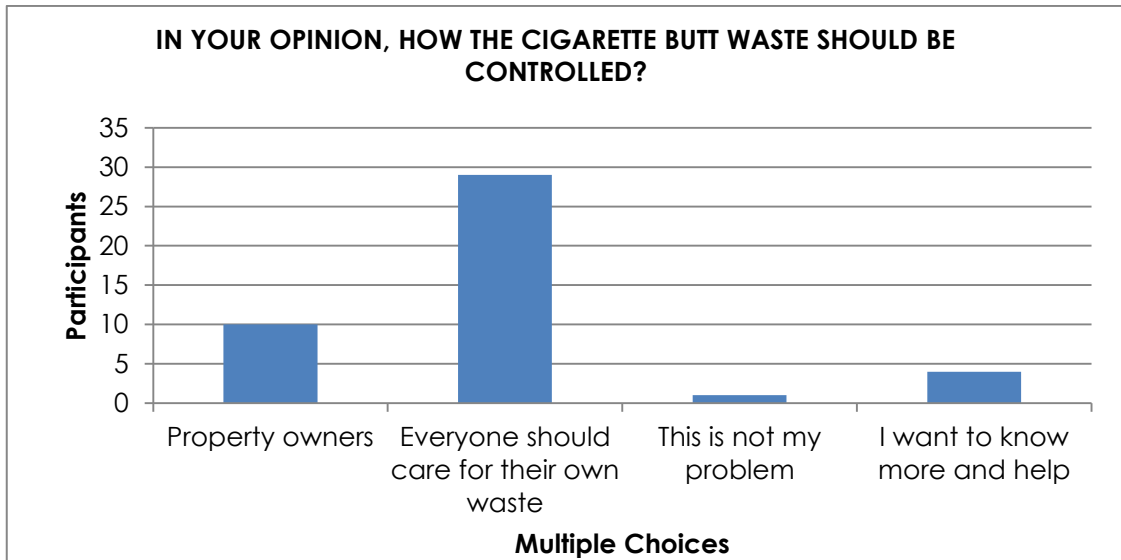


Figure 16. Participants response to reasons for littering $N = 32$

The question (figure 17): Do you think that cigarette butt litter is a problem at Campus Raseborg? was a mixed one with a majority agreeing that cigarette butt litter is a problem.

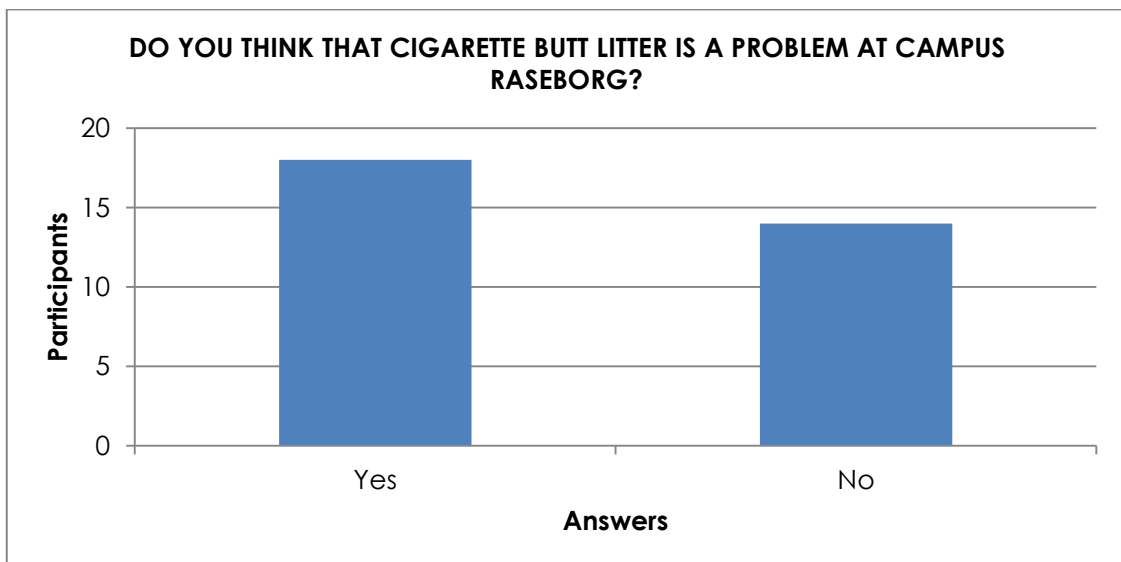


Figure 17. Participants response to litter problem at Campus Raseborg $N = 32$

Most respondents were in favor of a smoke-free policy at Novia University of Applied Sciences, Campus Raseborg (figure 18). However, in an open question about the same issue, some respondents wished to relocate existing smoking areas further from the building entrances at Campus Raseborg.

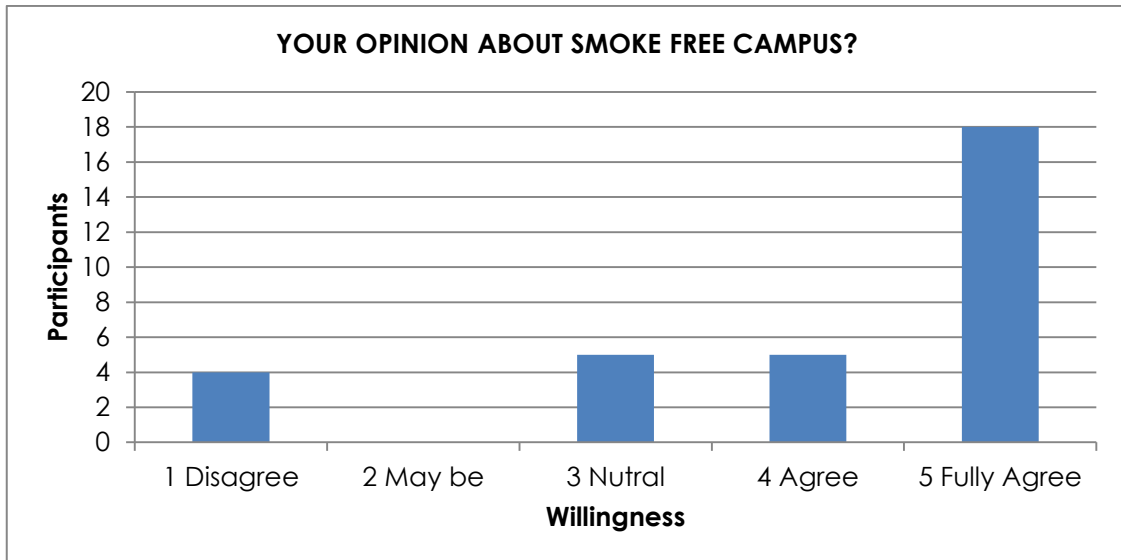


Figure 18. Participants response to reasons for littering $N = 32$

While evaluating the quality of the survey questionnaire (figure 18), a majority of the respondents found it very good.

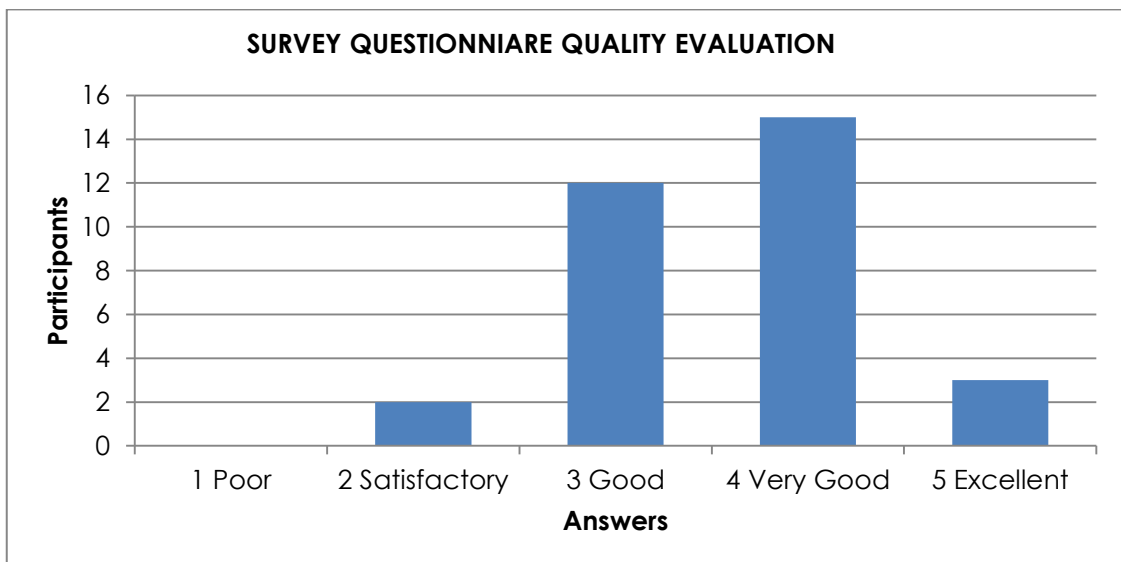


Figure 19. Survey questionnaire quality evaluation by participants $N = 32$

5 DISCUSSION

Many of our current practices are not sustainable. The crucial problem of the rapid environmental change has in fact originated from human behavior. Mitigating the impacts and saving the environment by a change in our behavior is a critically important aspect that needs attention. Development in every field has changed our lives, making us more comfortable and sensitive. Such human behaviors negatively affected the environment. Behavioral scientists have successfully applied the principles of behavior analysis to increase a variety of pro-environment behaviors and decrease a variety of behaviors that damage the environment. (Lehman & Geller, 2005)

The proposed integration of Axxell vocational school within Novia University of Applied Sciences, Campus Raseborg premises requires policy adaptation, not just to ease the integration process but also to make it sustainable. Novia University campuses are places of information, learning, leadership, and change. Regarding the adoption of policies to reduce or eliminate cigarette litter, Novia University has the responsibility to raise the level of attention to cigarette litter as an environmental hazard. A smoke-free policy at Campus Raseborg would reduce toxic cigarette butt litter produced by smokers on outdoor areas at the campus. Raising attention to the issue of cigarette litter as an environmental hazard on the campus could be helpful in further reducing litter prevalence or decreeing smoke-free policies.

Findings of this research indicate that a majority of the respondents believed that cigarette butts litter is harmful to the environment. However, a small number of the respondents did not believe that cigarette butts are toxic. More nonsmokers believed cigarette butts to be litter than smokers. In fact, across all cigarette litter attitude and belief items, nonsmokers endorsed that the cigarette butts are harmful to the environment in greater proportions than that of smokers, indicating that more education may promote pro-environmental behavior. The literature reviewed in this paper emphasizes various elements such as cigarette butt litter, load on the environment, littering behavior, and moral responsibilities towards environment. Whereas previous studies conclude various aspects about cigarette butt litter, the fact of the matter is that the most important of all is the moral responsibility, attitudes and behaviors. The respondents to the present research are educated and aware of environmental impacts. However, we still generate litter. This study, as well as many

previous studies emphasized malfunctioning attitudes and behavior and most importantly consideration of our moral responsibilities as an individual as well as an institute.

Regarding the effect of the cigarette butts and their components on the environment including non-biodegradable filters, the previous studies concluded that the cigarette butts and their components contaminate the environment. Previous studies about the attitudes, behaviors, and moral responsibility towards environment established the need for more education to promote pro-environmental awareness. In regards to moral responsibility towards the environment, it is important for institutions to facilitate the individuals with non-conservative, environmentally friendly policies that are straightforward and flexible enough to make the individuals follow. Such a methodology may cater the need to protect the environment from hazardous litter of cigarette butts and gradually helps the behavioral change among individuals. However, I believe that an individual behavior depends solely on the upbringing at a very early stage in life. The individual's good behavior depends upon parental guidance, familiarization with etiquettes, school education, and exposure to righteous company while growing up. The individual pupils who learn early in life have structure personalities for the rest of their lives and hence that makes them different.

6 CONCLUSIONS AND RECOMMENDATIONS

Most of the people understand that cigarette litter is an environmental problem; a minority still does not know tossed cigarettes butts as litter. This idea is associated with littering behavior that requires promoting awareness about the environmental impacts of cigarette butt litter. This research concludes that a pro-environmental behavioral awareness promotion is effective in controlling cigarette butt litter.

The campus property management today dedicates significant time and money to cleaning public areas and removing litter, including cigarette litter. The mitigation program for cigarette butt litter can financially benefit because it would reduce toxic waste disposed in public areas. Reducing cigarette butt litter also benefits the environment, because they contain many toxic substances that are harmful for the ecosystems. In addition, reducing toxic waste in outdoor areas could improve the quality of immediate environment.

Addressing the environmental problem of cigarette butt litter includes stronger litter laws, increased education on smoking and littering, more ashtrays and containers outdoor and properly assigned booths for smoking. On a general level, any policy that raises the awareness about environmental issues is good. However, a smoking ban eventually will lead to a litter-free environment.

Our university is a leading research institution. It has published several research studies proving environmental contaminations, yet it is lagging when it comes to its own campuses. Its policies are old and are falling behind several institutions in Finland. Many universities in the country surpassed our university in smoking policy. The University of Turku, University of Eastern Finland and the University of Jyväskylä are smoke-free with zero cigarette litter. The greatest actor is the university. The campus needs to take an active role against negatively effecting the environment. Regardless of the reasons for students smoking and littering, the campus can no longer be a willing participant in ruining the environment. *"We can make a difference"* working in close collaboration with the university aiming to protect the environment at the campus Raseborg.

While the current campus building codes restrict smoking in and within five meters of the campus buildings, the latter part remains ignored. The campus administration can effectively enforce its rules by taking measures to increase awareness of current rules and

regulations for all members of the campus community. One-way is to introduce access to a gym for students at the campus and finally introduce a university-wide smoke-free policy.

The most useful policy to enforce the reduction of cigarette butt litter is to ban on smoking within twenty-five meters of the campus building entrances. Students smoke mostly by the entrances and on the outdoor common areas of the building. Knowledge about cigarette butt litter can easily be spread by posting visible and many signs at the entrance to each of these buildings restricting smoking. Roaming property officials and student union tutors can help enforce the policy and respect it themselves. In addition, students can remind individuals of smoking checks. Finally, simple signs and posts should be present around the campus visible both to visitors and to students. This will increase awareness and decrease cigarette litter that is common across the campus.

The university, largely through the Center for Wellness, offers various programs designed to reduce stress; a gym is a good idea. Often inaccessible to students with busy schedules, such a program should invite newcomers early enough in their educational careers at the campus. Despite the multitude of initiatives and programs, students often do not use them fully either because of scheduling issues or expense. Further, the programs are not available at educational institutions. I recommend that the campus introduce a stress cut programs as early as possible to all students. Stress cut lessons should be included in the curriculum. An orientation week is good in the long-term. Ensuring students use the gym offer throughout their stay at the campus and eventually stay distracted from activities that contribute the littering.

All students use the campus outdoor area. A move to make the outdoor area smoke-free would be symbolic of a greater good towards making the University more environmentally conscious in its overall policies. The campus outdoor is where we welcome new students and we give farewell to old associates. A smoke-free outdoor initiative largely influences newcomers to the University to be aware of their own smoking habits. I also recommend that the campus compliments this recommendation with an active policy to publicize the smoke free policy in a positive way.

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APPENDICIES

APPENDIX 1

ENVIRONMENTAL AWARENESS SURVEY

Campus Raseborg 2013

We value your input, so your feedback is very important to us. Thank you for taking a few moments to complete the form. (* Required)

Your Field of Study or Department *

- ☐ Degree Program in Construction Engineering
- ☐ Degree Program in Construction Management
- ☐ Degree Program in Automation and IT
- ☐ Degree Program in Natural Resources and the Environment
- ☐ Degree Program in Natural Resources and the Environment - SCM
- ☐ Degree Program in Business Information Technology
- ☐ Campus Staff
- ☐ Aronia R&D

Other:

Your affiliation with Campus Raseborg *

- ☐ 1 Year or Less
- ☐ 2 Years or less
- ☐ 3 Years or less
- ☐ 4 Years or less
- ☐ 4 Years +

Gender *

- ☐ Male
- ☐ Female

Age Group *

- ☐ 20 or below
- ☐ 21 - 30

- ☐ 31 - 40
- ☐ 41 - 50
- ☐ 50 or above

How interested are you in learning more about Environmental Issues through Group Discussions at Campus Raseborg? *

Issues Related to waste and their impact on Environment.

- ☐ Yes I will attend
- ☐ I have no time to think of it even.
- ☐ Depends on the schedule of my day
- ☐ I am not interested

Do you think there is a link between health and environment in which we live? *

- ☐ Agree
- ☐ Neutral
- ☐ Disagree

Do you consider littering is a problem at the campus area? *

- ☐ Yes
- ☐ No

Do you Litter? *

(Considering litter an environmental problem)

- ☐ Often
- ☐ Sometimes
- ☐ Never

What are the reasons why you litter?

(Only if you answered sometimes or often to the last question)

- ☐ Could not find a trash bin
- ☐ Just happened
- ☐ Someone else will pick it up
- ☐ Was in hurry

Which of these things would you call litter? *

(Check all that apply)

- ☐ Cigarette butts
- ☐ Plastic (bags, bottles)
- ☐ Aluminum cans
- ☐ Lunch or Candy wrappers
- ☐ Fruit peels
- ☐ Paper
- ☐ None of these
- ☐ Gum

Other:

--

If you saw someone else litter, what would you do? *

(Check all that apply)

- ☐ Pick up the litter yourself
- ☐ Inform the property manager
- ☐ I would not do anything

Other:

--

Do you smoke? *

- ☐ Yes
- ☐ No
- ☐ Former Smoker

Are you aware of cigarette waste? *

- ☐ Yes
- ☐ No

What do you consider about the cigarette butts waste? *

- ☐ A Simple Waste
- ☐ A Toxic Waste

In your opinion, what is the impact of cigarette butt waste on our environment? *

- ☐ Cigarette Butt Waste pollute air
- ☐ Cigarette Butt Waste pollute water
- ☐ Cigarette Butt Waste pollute soil
- ☐ None of above
- ☐ All of above

In your opinion, how the cigarette butt waste should be controlled? *

- ☐ Property owners
- ☐ Everyone should care for their own waste
- ☐ This is not my problem
- ☐ I want to know more and help

Do you think that cigarette butt litter is a problem at Campus Raseborg? *

- ☐ Yes
- ☐ No

What do you think we should do about it?

(If you answered "yes" above)

Your opinion about Smoke Free Campus *

(Scale 1-5: 1=poor/negative, 5=excellent)

1 2 3 4 5

Poor ☐ ☐ ☐ ☐ ☐ Excellent

Your views about Smoke Fee Campus

(Optional)

Your Email Address

In case you like to participate to win a lunch voucher - First 30 complete responses to this survey will win a lunch voucher at university campus restaurant.

Please evaluate the quality of this questionnaire. *

(Scale 1-5: 1=poor/negative, 5=excellent)

1 2 3 4 5

Poor ☐ ☐ ☐ ☐ ☐ Excellent

Please note any additional comments or suggestions you have

(Optional)